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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/783,034	02/15/2001	Reza-Ur Rahman Khan	1875.0210000	5713

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EXAMINER

ANDUJAR, LEONARDO

ART UNIT	PAPER NUMBER
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2826

DATE MAILED: 03/26/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/783,034

Applicant(s)

KHAN ET AL.

Examiner

Leonardo Andújar

Art Unit

2826

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 18 February 2001.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-36 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-7, 9-23 and 25-35 is/are rejected.
- 7) ☒ Claim(s) 8 and 24 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 18 February 2001 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____
- 4) ☐ Interview Summary (PTO-413) Paper No(s) _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other:

DETAILED ACTION

Specification

1. The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed.

Drawings

2. The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the "circumferential surface between the first and second drop-in heat spreader surfaces must be shown or the feature(s) canceled from the claim(s). No new matter should be entered.
3. A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

Claim Rejections - 35 USC § 102

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

(e) the invention was described in-

(1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effect under this subsection of a national application published under section 122(b) only if the international application designating the United States was published under Article 21(2)(a) of such treaty in the English language; or

(2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that a patent shall not be deemed filed in the United States for the purposes of this subsection based on the filing of an international application filed under the treaty defined in section 351(a).

5. Claims 1-3, 9, 10, 12-14, 16-19, 25-27, 29-31 and 33-36 are rejected under 35 U.S.C. 102(e) as being anticipated by Lin (US 6,184,580).
6. Regarding claim 1, Lin (e.g. fig. 3) shows a ball grid array package comprising:

- A substrate 35 that has a first surface 31, a second surface 33, and a central window shaped aperture that extends through the surfaces;
- A stiffener /heat spreader 26 attached to the first substrate surface;
- A portion of the stiffener/heat spreader that is accessible through the central window-shaped aperture;
- An IC die 20 that has a first surface 24 and a second surface 21, wherein the first IC die surface is mounted to the accessible portion of the stiffener/heat spreader;
- And a drop-in heat spreader 42 that has a surface 43 that is mounted to the second IC die surface.

7. Regarding claim 2, Lin shows a plurality of solder balls attached to the second substrate surface.

8. Regarding claim 3, Lin shows that the drop-in spreader is configured to dissipate heat generated by the IC die (col. 5/ll. 14).

9. Regarding claim 9, Lin shows that the stiffener/heat spreader includes a central cavity. The central cavity forms part of the accessible portion of the stiffener/heat spreader. Also, the IC die is mounted on the central cavity.

10. Regarding claim 10, Lin shows that the stiffener/heat spreader is substantially planar. Also, the stiffener accessible portion is centrally located on the stiffener/heat spreader surface.

11. Regarding claim 12, Lin shows that the second die surface is greater than an area of a surface of the drop-in heat spreader 43. Also, Lin shows that the drop-in heat spreader is centrally mounted on the second IC die surface.

12. Regarding claim 13, Lin shows that the mold 28 encapsulates the drop-in heat spreader.

13. Regarding claim 14, Lin shows that the mold 28 encapsulates the drop-in heat spreader. Also, Lin shows that an exposed second surface 47.

14. Regarding claim 16, Lin suggests the use of a tape substrate (col. 6/ll.24)

15. Regarding claim 17, Lin discloses that the stiffener/heat spreader and the drop-in heat spreader can be made from the same material (col. 6/lls. 25-26). Therefore, Lin teaches that the stiffener and the drop-in heat spreader have the same thermal expansion coefficient.

16. Regarding claim 18, the device of claim 1 would necessarily have to be formed in order to function. Claim 18 fails to further limit the device of claim 1 other than simply form each of their component.

17. Regarding claim 19, the device of claim 2 would necessarily have to be formed in order to function. Claim 19 fails to further limit the device of claim 2 other than simply form each of their component.

18. Regarding claims 25 and 26, the device of claim 9 would necessarily have to be formed in order to function. Claims 25 and 26 fail to further limit the device of claim 9 other than simply form each of their component.

19. Regarding claim 27, the device of claim 10 would necessary have to be formed in order to function. Claim 27 fails to further limit the device of claim 10 other than simply form each of their component.

20. Regarding claim 29, the device of claim 12 would necessary have to be formed in order to function. Claim 29 fails to further limit the device of claim 12 other than simply form each of their component.

21. Regarding claim 30, the device of claim 13 would necessary have to be formed in order to function. Claim 30 fails to further limit the device of claim 13 other than simply form each of their component.

22. Regarding claim 31, the device of claim 14 would necessary have to be formed in order to function. Claim 31 fails to further limit the device of claim 14 other than simply form each of their component.

23. Regarding claim 33, the device of claim 16 would necessary have to be formed in order to function. Claim 33 fails to further limit the device of claim 16 other than simply form each of their component.

24. Regarding claim 34, the device of claim 17 would necessary have to be formed in order to function. Claim 34 fails to further limit the device of claim 17 other than simply form each of their component.

25. Regarding claim 35, Lin (e.g. fig 3) shows a system for assembling a ball grid array package:

- Means 40 for providing a substrate 35 that has a first surface 31, a second surface 33, and a central window shaped aperture that extends through the surfaces;
- Means 32 for providing a stiffener/heat spreader 26;
- Means 38 for attaching a surface of the stiffener/heat spreader to the first substrate;
- Means for mounting a first surface of an IC die 20 to the accessible portion of the stiffener/heat spreader (col. 4/lis. 4-5);
- And means 28 for mounting a surface of a drop-in heat spreader 42 to a second surface of the IC die 21.

26. Regarding claim 36, Lin suggests the use of a tape substrate (col. 6/ll.24). Also, Lin discloses a means 40 for providing a substrate

Claim Rejections - 35 USC § 103

27. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

28. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation

under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

29. Claims 4-7 and 20-23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lin (US 6,184,580) in view of Huang (US 2001/0045644 A1).

30. Regarding claim 4, Lin shows that the die surface includes contact pads and wires. However, Lin does not disclose a wire bond that couples the contact pad to the heat spreader. Hung (e.g. 4) teaches a semiconductor package having contact pads connected to a drop-in heat spreader 250 by a wire bond 238a. Moreover, Hung discloses that the heat sink is grounded by a wire bond in order to provide a better electrical performance [0025]. It would have been obvious to one of ordinary skill in the art at the time the invention was made to use a wire bond to couples the contact pads and the drop-in heat spreader of Lin, in order to provide better electrical performance as taught by Hung.

31. Regarding claim 5, Lin shows that the second drop-in heat spreader surface 47 is attached to a printed circuit board 60 (e.g. fig. 4).

32. Regarding claim 6, Hung discloses that the contact pad is a ground contact pad. Also, Lin discloses that the drop heat spreader operates as a ground plane (col. 6/lis. 6/lis. 14-16).

33. Regarding claim 7, Lin shows that the planar drop-in heat spreader 42 has a ridge 44a, a first surface 43 parallel to a second planar surface 44' (see attachment fig.

3). As shown in figure 3, the first planar surface is greater than the second planar surface. Lin does not explicitly disclose a circumferential surface. Nonetheless, this limitation, absent any criticality, is only considered to be an obvious modification of the shape of the projection surface disclosed by Prior Art as the courts have held that a change in shape or configuration, without any criticality, is within the level of skill in the art as the particular shape claimed by applicant is nothing more than one of numerous shapes that a person having ordinary skill in the art will find obvious to provide using routine experimentation based on its suitability for the intended use of the invention. See In re Dailey, 149 USPQ 47 (CCPA 1976).

34. Regarding claim 20, the device of claim 4 would necessary have to be formed in order to function. Claim 20 fails to further limit the device of claim 4 other than simply form each of their component.

35. Regarding claim 21, the device of claim 5 would necessary have to be formed in order to function. Claim 21 fails to further limit the device of claim 5 other than simply form each of their component.

36. Regarding claim 22, the device of claim 6 would necessary have to be formed in order to function. Claim 22 fails to further limit the device of claim 6 other than simply form each of their component.

37. Regarding claim 23, the device of claim 7 would necessary have to be formed in order to function. Claim 23 fails to further limit the device of claim 7 other than simply form each of their component.

38. Claims 11, 15, 28 and 32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lin (US 6,184,580).

39. Regarding claim 11, Lin shows that the IC die is mounted to the stiffener/heat spreader with a first attaching means (col. 4/lls. 3-5). Also, the drop-in heat spreader is mounted to the IC die with a second attaching means 28 (e.g. fig. 3). The second attaching means is an epoxy (col. 4/lls. 60-62). Lin discloses that conductive paste or insulating paste can be used as a first attaching means. Official Notice is taken with respect to the use of an epoxy as a first attaching means since it is very well known in the art to use epoxies as conductive or insulating pastes. Thus, to mount the IC on the stiffener/heat spreader using an epoxy would have been obvious to a person having ordinary skill in the art at the time the invention was made since epoxies are very well known types of conductive or insulating pastes commonly used in the art.

40. Regarding claim 15, Lin shows most aspect of the instant invention including a surface 44 between the first and second drop-in heat spreader surfaces. Also, this surface is partially exposed (the side wall of the projection 44). Lin does not explicitly disclose that the surface 44 is a circumferential surface. Nonetheless, this limitation, absent any criticality, is only considered to be an obvious modification of the shape of the projection surface disclosed by Prior Art as the courts have held that a change in shape or configuration, without any criticality, is within the level of skill in the art as the particular shape claimed by applicant is nothing more than one of numerous shapes that a person having ordinary skill in the art will find obvious to provide using

routine experimentation based on its suitability for the intended use of the invention. See In re Dailey, 149 USPQ 47 (CCPA 1976).

41. Regarding claim 28, the device of claim 11 would necessary have to be formed in order to function. Claim 28 fails to further limit the device of claim 11 other than simply form each of their component.

42. Regarding claim 32, the device of claim 15 would necessary have to be formed in order to function. Claim 32 fails to further limit the device of claim 15 other than simply form each of their component.

Allowable Subject Matter

43. Claims 8 and 24 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Remarks

44. Regarding claims 18-34, the recitation "a method of forming..." has not been given patentable weight because the recitation occurs in the preamble. A preamble is generally not accorded any patentable weight where it merely recites the intended use of a structure, and where the body of the claim does not depend on the preamble for completeness but, instead, structural limitations are able to stand-alone. See *In re Hirao*, 535 F.2d 67, 190 USPQ 15 (CCPA 1976) and *Kropa v. Robie*, 187 F.2d 150, 152, 88 USPQ 478, 481 (CCPA 1951).

Conclusion

45. Papers related to this application may be submitted directly to Art Unit 2826 by facsimile transmission. Papers should be faxed to Art Unit 2826 via the Art Unit 2826 Fax Center located in Crystal Plaza 4, room 3C23. The faxing of such papers must conform to the notice published in the Official Gazette, 1096 OG 30 (15 November 1989). The Art Unit 2826 Fax Center number is **(703) 308-7722** or **-7724**. The Art Unit 2826 Fax Center is to be used only for papers related to Art Unit 2814 applications.

46. Any inquiry concerning this communication or earlier communications from the examiner should be directed to **Leonardo Andújar** at **(703) 308-0080** and between the hours of 9:00 AM to 5:00 PM (Eastern Standard Time) Monday through Friday or by e-mail via Leonardo.Andujar@uspto.gov. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nathan Flynn, can be reached on (703) 308-6601.

47. Any inquiry of a general nature or relating to the status of this application should be directed to the **Group 2800 Receptionist** at **(703) 305-3900**.

48. The following list is the Examiner's field of search for the present Office Action:

Field of Search	Date
U.S. Class / Subclass (es): 257/706, 707, 717 and 737	03/01
Other Documentation:	
Electronic Database(s): East (USPAT, US PGPUB, JPO, EPO, Derwent, IBM TDB)	03/01

Leonardo Andújar
Patent Examiner Art Unit 2826

LA
3/16/02



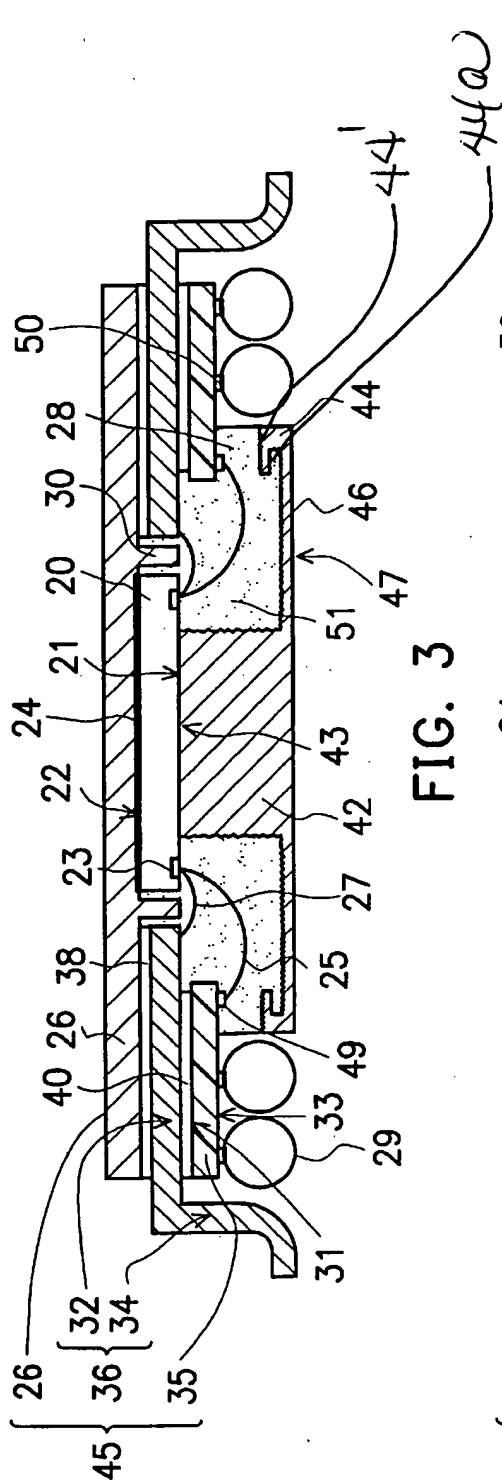


FIG. 3

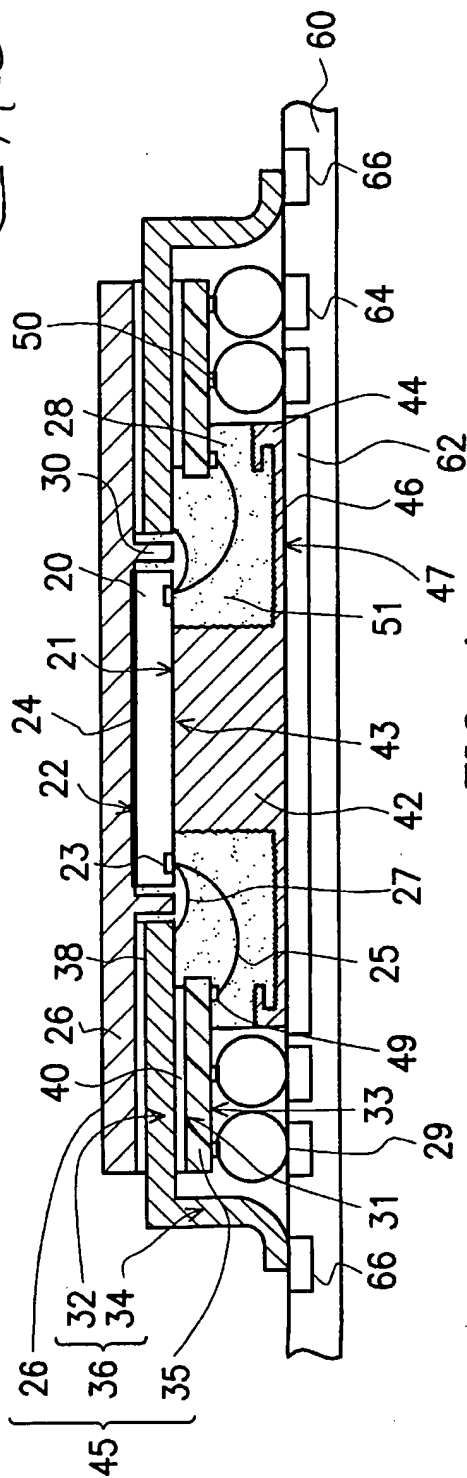


FIG. 4